

Patent Claims

1. Process for the simultaneous realization of at least one chemical reaction
5 in at least two separate reaction vessels, wherein said process comprises at least the following steps:
 - (i) providing at least one reaction mixture per reaction vessel;
 - 10 (ii) pneumatic agitation of the reaction mixture in at least one reaction vessel by bringing the reaction mixture into contact with at least one fluid phase,and wherein the at least one chemical reaction in at least one of the reac-
15 tion vessels is carried out in the batch mode and wherein the reaction mixture contains at least one liquid phase.
2. Process as claimed in claim 1, characterized in that the fluid phase is sup-
20 plied over a defined period and is at least partially discharged from the reaction vessel.
3. Process as claimed in claim 2, characterized in that by means of adjusting
25 the flow rate of supply and discharge, a stationary state is reached with regard to the fluid, which flows through the reaction vessel.
4. Process as claimed in at least one of the preceding claims, characterized in
that the reaction mixture contains at least one of the following further con-
stituents:
 - 30 at least one second liquid phase, which is not miscible with the at least one liquid phase of the reaction mixture;

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at least one solid.

5. Process as claimed in claim 4, characterized in that the at least one second liquid phase or the solid or both comprises/comprise at least one catalyst, wherein the catalyst can be homogeneous or heterogeneous and solid or fluid.
6. Process as claimed in claim 5, characterized in that at least two catalysts are provided in at least two reaction vessels, which can be the same or different.
7. Process as claimed in at least one of the preceding claims, characterized in that the reaction mixtures for each reaction vessel are freely selectable independently from each other.
8. Process as claimed in at least one of the preceding claims, characterized in that the at least one fluid phase for the pneumatic agitation of the reaction mixture takes part in the reaction or is inert.
9. Process as claimed in at least one of the preceding claims, characterized in that at least one of the parameters, which can be adjusted in at least one of the reaction vessels, is varied at least temporarily and/or also in sections.
10. Process as claimed in claim 9, characterized in that the at least one parameter is selected from the group comprising: temperature in the reaction vessel, reflux temperature, pressure in the reaction vessel, pressure in at least one means for supply, duration of the reaction, duration of the supply of the at least one fluid phase for pneumatic agitation; quantity of fluid, which flows through, superficial velocity, concentration of the at least one fluid phase for pneumatic agitation.

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11. Process as claimed in claim 10, characterized in that the control of the parameters in all reaction vessels is carried out in the same manner, or is carried out in at least two reaction vessels in a different manner.
- 5 12. Process as claimed in at least one of the preceding claims, characterized in that a homogeneous or a heterogeneous flow condition exists in the reaction vessels.
- 10 13. Device for the simultaneous realization of at least one chemical reaction in an array of reaction vessels, wherein said device comprises at least the following components:
- 15 (i) at least two separate reaction vessels with at least one reaction mixture per reaction vessel;
- (ii) at least one means for supply of at least one fluid phase in at least one reaction vessel,
- 20 and that the means for supply has to be formed in a manner that it allows the pneumatic agitation of the reaction mixture in at least one reaction vessel by means of the fluid phase, as well as that the chemical reaction in at least one of the reaction vessels is carried out in the batch mode.
- 25 14. Device as claimed in claim 13, characterized in that the supply of the fluid phase is carried out by means of a plurality of means for supply, which are connected materially with each other.
- 30 15. Device as claimed in claim 13 or 14, characterized in that the device comprises at least one further component, wherein said at least one further component is selected from the group comprising:

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at least one further means for supply,
at least one means for fluid flow control,
at least one means for phase separation,
at least one means for fluid metering,
5 at least one means for insertion,
at least one means for adjustment of parameters,
at least one by-pass.

16. Device as claimed in claim 15, characterized in that (i) the means for
10 phase separation is a membrane or a frit or a reflux condenser or a combination thereof, or that (ii) the means for adjustment of parameters is a heating unit, a cooling unit, a pressure controller, a valve, a flow controller, or a combination thereof, or that (iii) the means for fluid flow control is a package of ball-shaped bodies or an arrangement of plates, or that (iv)
15 the means for insertion is a nozzle, a tube or a capillary, an injector, a frit, or a combination thereof, as well as an (v) arbitrary combination of the means (i) to (iv).

17. Device as claimed in at least one of the claims 13 to 16, wherein the reaction vessel is cylindrical and has an inner diameter of from 3 mm to 50
20 mm and/or a height of from 150 mm to 350 mm.

18. Device as claimed in any one of the claims 13 to 17, characterized in that the individual reaction vessels are run in a parallel manner towards each
25 other and/or are run at least partially in series.

19. Device as claimed in any one of the claims 13 to 18, characterized in that each reaction vessel has at least two means for supply, wherein the one means serves for the supply of the at least one fluid for pneumatic agitation and the at least one other means for supply serves for the at least partial
30 discharge of said fluid.

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20. Use of the process as claimed in any one of the claims 1 to 12 or of the device as claimed in any one of the claims 13 to 19 for reactions, in which at least one liquid phase takes part, in particular for oxidations, hydrogenations, hydrohalogenations, halogenations, hydroformulations, ozonolysis, carboxylations, alkylations, fermentation reactions, polymerisation reactions, manufacture of inorganic solid bodies, waste water treatment, Fischer-Tropsch-synthesis.

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